

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Axel K. Kloth

Application No.: 10/759,583

Filed: January 15, 2004

For: METHOD AND APPARATUS FOR  
IMAGE PROCESSING

Customer No.: 20350

Confirmation No. 8008

Examiner: TSAI, TSUNG YIN

Technology Center/Art Unit: 2624

DECLARATION OF DR. JOHN  
GUSTAFSON UNDER 37 C.F.R. §1.132

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

I, John F. Gustafson, declare as follows:

1. I am currently Chief Technology Officer of ClearSpeed Technology Inc., a company with a market capitalization of over \$100 million that specializes in high performance computing. In addition I am a member of the Board of Directors of Massively Parallel Technology Inc.
2. I hold Ph.D. and M.S. Degrees in Applied Mathematics from Iowa State University, Ames, Iowa (1982, 1981) and a B.S. Degree in Applied Mathematics from the California Institute of Technology, Pasadena, California (1977).
3. Over the past 34 years, I have held technical positions related to the computational sciences at JPL, Floating Point Systems, Inc., nCube, Sandia National Laboratories, Colorado MEDTech, SUN Microsystems, Sun Labs, and Enterprise Cluster Solutions, Inc,

4. In addition, from 1989 through 1998, I held an academic appointment as an Adjunct Associate Professor in the Department of Computer Science at Iowa State University and was Visiting Professor at New Mexico State University in 1998.
5. I have been awarded four patents and have pending patents in the fields of massively parallel computing and other areas related to computational systems.

6. For my work and contributions I have been recognized as follows:
  - 2006 **IEEE International Atanasoff Award**
  - 2000 **Iowa State University Inventor of the Year Award**
  - 1998 **Distinguished Visiting Professor, New Mexico State University**
  - 1997 **PDPTA Outstanding Achievement Award**
  - 1989, 91, 95 **R&D 100 Awards**
  - 1990 **New Mexico Inventor of the Year Award**
  - 1988 **Gordon Bell Award** (Greatest annual contribution to the science of parallel processing)
  - 1988 **Karp Challenge** (First demonstration of parallel speedup of over 200 times)
  - 1974 **Eric Temple Bell Award** (Caltech; for “Outstanding Original Research in Mathematics”)

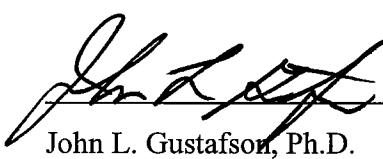
7. I am the author of numerous reports and refereed papers in the field of computational machines.
8. Among other accomplishments, I built a replica of and verified that the Atanasoff-Berry Computer built in Iowa (1938-1942) was the first programmable digital computer.
9. I am known for Gustafson’s Law on the scalability of computer processing.
10. I am personally familiar with the work of Dr. Axel Kloth and make this declaration as an individual without a financial interest in or commercial relationship with, Parimics, Inc., assignee of this patent application.

11. I have read the specification and claims of U.S. Patent Application Serial Number 10/759,583, as amended October 11, 2007 (Kloth), and I understand the claims. Paraphrasing, the claims recite a system and method performing object independent per-frame layered processing of images without need to access external memory using parallel processors associated with individual pixels.
12. I am familiar with the Cited Patents U.S. Pat. No. 5,214,713 (Juvinal), U.S. Pat. No. 5,535,288 (Chen et al.), and U.S. Pat. No. 5,706,209 (Shaw et al.).
13. I have read and understand the arguments dated October 11, 2007 in support of the claims of Kloth.
14. I have read and considered the Claim Rejections in the Office Action against the claims of Kloth dated October 23, 2007.
15. In my opinion as an expert of more than 34 years in the relevant fields, including parallel computing, the Patent Office rejection of the claims of Kloth on the basis of the combination of the Cited Patents is without rational foundation. The Juvinal reference does not stand for the propositions advanced by the Examiner as extracted from the language of the claims submitted by Kloth. The Chen et al. reference and the Shaw et al. reference do not supply the deficiencies. One of ordinary skill in the relevant art would not think to combine the references and would not find the combination obvious to realize the invention claimed by Kloth.
16. I found the arguments presented in the amendment dated October 11, 2007 accurate and succinct, properly stating numerous distinguishing features of the claimed invention over the Cited Patents.
17. While both systems are intended for image processing using parallel computing, there is a profound difference in that Juvinal stores computations to memory between stages whereas the Kloth method passes them layer to layer without using memory.

18. I would analogize Juvinal to that of an industrial production line where the assembly workers find a partly-completed product on the shelves, take it to their desk, work on it, and put it back in the shelves for others to work on as the next stop.
19. By contrast, the Kloth approach is analogous to an advanced assembly-line with a conveyor belt where the wasted motion of putting things on a shelf or taking them off is eliminated, greatly increasing speed and productivity.
20. The motivation to make the invention did not exist at the time in the early 1990s when Juvinal created his approach, since the memory bottleneck was not severe as it was when this invention was made, and it called for a design that allowed different types of processors to work on different stages of the computation.
21. The environment of the invention that is addressed by Kloth is one where fetching or storing from memory takes hundreds of times longer than the processing of the data, and hence one would not be able to design a 2007-era version of Juvinal's design that would be useful to solve the problems that Kloth addresses.
22. The Examiner's statement that it would be obvious to replace memory with registers because of the inherent speed advantage has no basis. The layered approach of Kloth (roughly analogous to the conveyor belt) is not a mere replacement of memory with registers. The invention is a different approach that increases performance by at least an order of magnitude and represents a conceptual advance far beyond that shown in the Juvinal patent.
23. The Juvinal patent in fact teaches *against* the modern Kloth processing approach of passing data from layer to layer and avoiding the use of external memory. Hence, there is no way that it can be considered relevant prior art relative to the novel contribution of Kloth.
24. I note from the disclosure that there are many other advances in the Kloth design, but it is unnecessary to discuss other innovations, given the clear differences recited in the claims.

25. Moreover, the Kloth invention is so clearly distinguishable on the basis of its claim language and so fundamentally different in architecture and intended purpose from the Cited Patents that I am astonished that the Examiner has taken the position he is taking. Kloth's work is truly a groundbreaking innovation.

26. Further, I declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true and these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Title 18 of the United States Code Section 1001, and may jeopardize the validity of the application and any patent issuing thereon.



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John L. Gustafson, Ph.D.

Feb. 8, 2008

Dated: